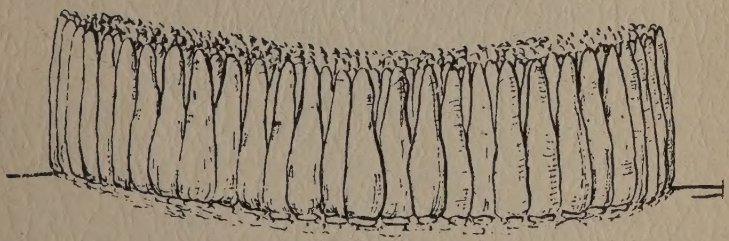
Mosquito News

Vol. 2, No. 1 MARCH, 1942

IMP. INST. ENT.
— LIBRARY —
- 7FEB1945
SERIAL U.S.A. 146
SEPARATE

Egg



Egg Raft

Egg

Issued By
Eastern Association of Mosquito Control Workers

OFFICERS

L. A. STEARNS, Delaware ..... President
R. C. BOTSFORD, Connecticut ..... Vice-President
R. L. VANNOTE, New Jersey ..... Vice-President
T. D. MULHERN, New Jersey ..... Secretary

PUBLICATION COMMITTEE

R. J. VANDERWERKER, Cranford, N. J., Chairman

JAMES HART C. WILLIAMSON

TABLE OF CONTENTS

	Page
Editorial Section	1
Business of Eastern Association	2
Country Wide Mosquito Control	3
Activities in Member States	18
Developments in Mosquito Control	28
Published Articles of Interest	31
Personal Notes	31

EDITORIAL COMMENT

Of all the activities coming under the jurisdiction of the various mosquito control organizations probably the most important is that phase which deals with disease prevention. Sleeping sickness, yellow fever, malaria, dengue and filariasis are the important diseases carried by the mosquito. There is no effective way of preventing the spread of these diseases except by control of the mosquito.

The most difficult angle of the situation is the problem of dealing with the ever shifting population of the country due to the war. The very nature of our war effort makes it necessary to move large numbers of workers from their place of residence to locations of new industrial plants. Some of these workers emigrate from disease infected centers to non-infected areas carrying the disease with them. In a recent newspaper article it was mentioned that eight members of the crew and four passengers on a ship arriving in New York Harbor were suffering from malaria. Cases like this create a very serious mosquito control problem. It cannot be handled by work in specified localities. It necessitates nation wide effort.

The Publication Committee of the Mosquito News, is taking this opportunity to make a plea to all members interested in mosquito control to send to the Committee any items of interest relative to the mosquito problems in their areas. For the continued success of the "News" this must be everyone's responsibility.

EASTERN ASSOCIATION OF MOSQUITO-CONTROL WORKERS

Committee Appointments - 1942

Publication Committee
- Ralph J. VanDerwerker, Chairman
- James Hart, Jr.
- C. T. Williamson

Membership Committee
- R. C. Botsford, Chairman
- Robert D. Glasgow
- Fred A. Reiley

Committee on Meetings and Annual Tour
- L. W. Smith, Chairman
- J. M. Ginsburg
- J. Lyell Clarke

Committee on Summer One-Day Inspection Trips
- Russell W. Gies, Chairman
- C. L. Chapman
- Perry W. Ruth

Dr. Louis A. Stearns, President

COUNTY-WIDE MOSQUITO CONTROL

Work on Mosquito Problems in States not Included in the Eastern Association of Mosquito-Control Workers

By F. C. Bishopp

Considerable impetus has been given to mosquito control as a result of the defense work to which this country is now earnestly devoting itself. The concentration of men in new areas is certain to present a mosquito and malaria problem. This is particularly true in the South, and it is in this part of the country that many of the military activities are centered. Close cooperation between those branches of the military establishment which are charged with responsibility for antimosquito work and Federal, State, and local governmental agencies responsible for extra-cantonment sanitation is essential if the work is to be most effective. Unfortunately, in many areas where defense activities are most intense, mosquito-control organizations, as such, are nonexistent. In such areas the development of effective mosquito-control units and the elimination of some of the serious mosquito problems should not only safeguard the health and comfort of those engaged in defense activities but serve as a demonstration of what can be done and a stimulus to a continuing antimosquito program.

In a brief review of mosquito-control work throughout the greater part of the country it is obviously impossible to cover adequately the various activities. Furthermore, many worthwhile undertakings undoubtedly have not come to the author's attention.

The writer wishes to express appreciation to those directing mosquito control in the various States for furnishing data on, and reviewing the summary of, their work.

Work in the South

Antimosquito work in the South has been carried on very largely as Works Progress Administration projects and for the most part under the auspices of the several State Boards of Health. In most of the Southern States the work has been directed almost exclusively against malaria mosquitoes. In some of the States administrative units concerned exclusively with antimalaria work and closely related problems have been set up. In others the work has been conducted by the units concerne with preventable diseases or some group with similar functions. The type of organization and scope of the work therefore vary considerably in different States.

In Georgia, as reported by Dr. Justin Andrews, Director of the Division of Malaria and Hookworm Service, the anti-mosquito work is carried out jointly by subdivision of the Division of Malaria and Hookworm Service and the Division of Public Health Engineering. The personnel in the first division consists of a director, medical epidemiologist, engineer, biologist, and, during the three summer months, four assistant biologists. Considerable attention is given to educational, promotional, and planning phases of malaria control, according to principles of the "Standard Plan". The work includes malariometrical and entomological surveys, specia malaria investigations, and the publication of The Georgia Malaria Bulletin.

Work under the Standard Plan has gone forward during the season of 1940 in at least nine counties. Special investigations have been carried out in many other counties and assistance has been given in formulating local control problems. Where these involved filling, drainage, clearing, larviciding, and other physical methods the malaria control engineer and his assistant in the Division of Public Health Engineering supervised the works projects.

A State-wide mosquito-proofing program has been promoted by the malaria-investigations engineer in cooperation with the Federal Security Administration and the National Youth Administration.

Research has been undertaken on methods of application of larvicides, particularly paris green, on methods of identifying anopheline larvae, and on the distribution and intensity of malaria in the State and its association with enviromental factors.

Funds were provided by the International Health Division of the Rockefeller Foundation for the purchase of equipment to be sent to counties to encourage the construction of precast concrete ditching materials, and to make evaluative study of the cost of anti-malaria efficiency and ditch-lining operations.

The Emory University Field Station, located near Newton, Baker County, Ga. operating under the State Board of Health, continued its studies of favorable and unfavorable conditions for the breeding of quadrimaculatus, and its study of the relationship of malaria prevalence to water levels.

In Alabama the anti-malaria work is carried out largely under the auspices of the State Health Department. Three engineers are devoting full time to malaria control and five field engineers to environmental sanitation and other phases of malaria-control work.

County health departments are becoming better organized and supported in 67 counties of the State, full-time county health departments, consisting of doctor, nurse, and secretary, being in operation. In 59 of these counties full-time sanitary officers are also provided.

For several years the State Health Department has sponsored a State-wide drainage project for malaria control, and this was continued to June, 1940.

In 1927 the State Board of Health adopted regulations governing the impounding of water. During the past year a manual on impounded water for use of the county health departments was prepared. Inspection and supervision of all artificially created ponds having an area less than 100 acres, which are subject to the regulations were carried on by the county health departments, with the assistance of the State Health Department. There are about 23 lakes that have a combined area of 200,000 acres which fall under the direct supervision of the State Health Department. The responsibility for controlling mosquito breeding in ponds falls upon the owner.

During 1940 a study and appraisal of the malaria problem of the eight Alabama counties bordering the Tennessee Valley was completed. Various aspects of the problem in each of these counties were analyzed and the results supplied to the counties for their guidance in malaria control work.

Municipal mosquito control in Alabama is the responsibility of the municipality. When a municipality requests it, an estimate of the cost of an anti-malaria campaign is made by the State Health Department. Approximately 25 municipalities carry on annual mosquito control programs.

In Mississippi, according to a statement by Nelson H. Rector, Assistant State Director of Malaria Control Work in the control of malaria is carried on under the management of the Directors of the Divisions of Sanitary Engineering and Preventable Disease Control. All engineering work in connection with the program comes under the management of the Director of Sanitary Engineering, while all medical and entomological activities, both investigational and for control, are managed by the

Director of the Division of Preventable Disease Control. Since the beginning of the permanent malaria-control program in Mississippi in May, 1936, more than 200 miles of permanently lined ditch has been constructed in 163 towns in 67 Mississippi counties on the W.P.A. Malaria Control Program. In addition, a relatively large amount of underground drains was laid and, where practicable, small ponds and swamps were eliminated by filling. These permanent ditch linings were constructed of reenforced concrete or brick and mortar, and experimental inverts were constructed of asphalt.

In Florida mosquito-control work has been carried forward along both control and research lines. Three additional counties, Palm Beach, Martin, and Sarasota, have organized mosquito-control districts. In Broward County salt-marsh mosquito control was continued during the last year under the direction of Fred H. Stutz. This work was covered by a 1-mill assessment which provided something over $5,600 for expenditure during 1940. About 25,000 lineal feet of ditches was installed, and something over 50 lineal miles of ditches was reconditioned during the past season.

Anti-mosquito work was continued in Dade County under the direction of Mr. Stutz with funds provided through a ½-mill levy. Most of the anti-mosquito work consisted of ditch maintenance and domestic-mosquito control, including inspection of premises, oiling of catch basins, and general clean-up work. An outstanding feature in the past season's work against salt marsh mosquitoes was ditching of the soft limestone rock by the use of dynamite in the heavy breeding areas on Elliott's Keys, 22 miles south of Miami. In the control of mosquito breeding in catch basins and other breeding places in the county oil was used. Paris green was largely depended upon where a lasting larvicide was needed. It proved especially valuable in such places as elevator pits, basements, cement mixers, jardinieres, and many others too numerous to mention. It was found to be especially effective in unused toilet bowls and old discarded automobile tires.

The summer of 1940 was considered a bad mosquito year. Aedes taeniorhynchus was the predominant salt-marsh species involved, and Psorophora columbiae as more abundant and generally distributed than in many years. Mosquito annoyance has been noticeably less in 1941 than in 1940.

Research work on mosquitoes was carried on as heretofore by the Bureau of Entomology and Plant Quarantine at Orlando and New Smyrna and by the Rockefeller Foundation at Tallahassee and Pensacola. The work financed by the Rockefeller Foundation dealt with various aspects of the malaria problem.

At Orlando, laboratory testing of a large number of new organic compounds as mosquito larvicides was continued under the direction of Dr. W. V. King and field tests of Phenothiazine and paris green were also conducted. At New Smyrna measurements of the rates of production of salt-marsh mosquito larvae in different types of marsh and the effect of control measures on breeding, studies of chemical factors influencing the hatching of Aedes eggs, and development of sod-sampling methods determining the distribution of eggs on the marshes were the major lines of investigation followed by Mr. George H. Bradley and his associates. The cooperation of the Bureau with the East Volusia County Commission was continued. Approximately 3,700 acres of marsh have now been ditched out of approximately 20,000 acres of salt-marshes in the county. About 37 percent of what appear to be the most important areas are now ditched. The seasonal average catch of several status traps operated in Volusia County indicates a reduction of salt-marsh mosquitoes during 1940 of from 50 to 80 percent; however, larval production rates on unditched marshes was also low during the season.

In Louisiana John M. O'Neill, Chief of the Division of Public Health Engineering, Department of Health, reports that early in 1940, because of expected concentra-

tion of Army personnel at Camp Beauregard for the spring war maneuvers, a detailed survey was made to locate all mosquito-breeding places and particularly breeding places of malaria mosquitoes within flight range of Camp Beauregard. Methods of control were developed and arrangements were made for a comprehensive mosquito-control program. A very considerable amount of time was devoted to supervision of mosquito-control activities in the Camp Beauregard area before, during, and after the spring maneuvers in anticipation of the August maneuvers. Following the cessation of larviciding operations in the Camp Beauregard area, a report covering these activities was prepared and copies were furnished to interested governmental agencies.

In anticipation of the establishment of army training camps in Louisiana, reconnaissance surveys were made of the areas in which the camps were to be located, to determine the mosquito hazard and to estimate the amount of construction work required and the larvicidal control measures needed to protect the trainees from malaria and other insect-borne diseases. This work included consideration of communities visited by officers and trainees at night.

Plans and estimates were prepared for a larviciding project to furnish protection to officers and trainees against mosquitoes until such time as construction would make this work unnecessary. During the latter part of May of this year, arrangements were completed for this project to be operated by equipment of the State Board of Health with supplies furnished by the United States Public Health Service.

Actual larviciding operations were begun on June 2 in the Alexandria area and in the New Orleans lake-front area, and were soon extended to include the Bossier City-Barksdale Field area and the Leesville-Camp Polk area.

At the present time extensive larviciding operations are being carried on in all military areas in the State of Louisiana, with the cooperation of the Works Projects Administration. In connection with this larviciding work, experiments have been made in which both oil and commercial phenol larvicides have been used.

A considerable amount of permanent drainage work has been carried on by the Army with WPA assistance.

For Texas Dr. George W. Cox, State Health Officer, furnishes the following information concerning work in that State. During the past 2 years the Texas State Department of Health has accomplished the following in malaria control and investigation: City and county health officers were educated regarding malaria-carrier detection and eradication work, mosquito surveys were conducted for educational and estimating purposes, and consultations were held with local health officials and private physicians in dealing with chronic cases. The treatment for malaria in cooperation with eleemosynary institutions and in the Texas Prison System, dealing with the proper time to administer therapy was further developed. The development of better technic has resulted in a lower death rate for this type of work. Private physicians can now secure malaria inoculations for their paretic patients. Blood examination of over 7,000 college students was made, resulting in the detection of 79 carriers. The second year that the same colleges were surveyed only 11 carriers were detected.

Entomological studies were confined chiefly to Anopheles quadrimaculatus. An insectory has been maintained for the propagation of this species for use in malaria therapy.

Waters newly impounded to prevent mosquito propagation, received considerable attention and an extensive drainage program conducted with the use of WPA labor was

carried out.

In Arkansas mosquito-control work is directed especially against anopheline mosquitoes and is carried on under the supervision of the State Department of Public Health. William R. Horsfall, assistant entomologist at the University of Arkansas, reports that in that State 1 State-wide and 2 district faunal studies have been made. Observations on the biology of little known species have been and are under way as a part of the research program. Special attention is being given to the biologies of the floodwater species, particularly those of the genus Psorophora. In connection with survey 42 species of mosquitoes have been collected in the State. These represent 10 genera and 14 of the species are of distinct importance.

A well balanced program of malaria control is being conducted in the Tennessee Valley by the Health and Safety Department of the Tennessee Valley Authority, of which Dr. E. L. Bishop is director. The staff of the Department gives technical direction to the malaria-control operations on the 8 major and minor impoundages of the Tennessee Valley Authority. This involves more than 288,000 acres of water with 4,600 miles of shoreline. The control measures largely relied upon include water-level fluctuation supplemented by shore-line clearing and other maintenance work. This has resulted in a reduction in the amount of larvicidal work necessary. Houses on several areas near the Wheeler Reservoir have been screened as a substitute for larvicidal measures. A total of 700 houses have been mosquito-proofed.

A number of different lines of research have been carried on by the Tennessee Valley Authority, several of these being in cooperation with other governmental agencies. These include studies of the efficiency of mosquito-proofing as a malaria-control measure, new larvicides, trapping of Anopheles quadrimaculatus, the influence of water temperatures, and other ecological

factors on anopheline breeding, the use of herbicides and mechanical cutting of aquatic plants as control measures, investigations of the possibility of using various birds as laboratory animals for thermotherapeutic studies on malaria, and studies of the relation of malaria-control procedure to wildlife conservation.

Considerable study has been given to the possibility of permanent shore-line improvements such as dyking and de-watering serious mosquito breeding areas during the mosquito-breeding season with a view to reducing annual costs of maintenance and application of larvicides and providing more effective control. The first provision of this type is under construction in the Wheeler Refuge in cooperation with the Fish and Wildlife Service, Department of the Interior.

Blood surveys carried out during the fall of 1940 indicated that the malaria rate appeared to be falling as compared with 1939, while station inspections indicated that Anopheles quadrimaculatus was as prevalent as during 1939.

The U. S. Public Health Service has closed its research laboratory at Savannah, Ga. and has concentrated its research work on malaria in Memphis, Tenn., under the direction of Dr. V. H. Haas, Dr. L. L. Williams having been designated as liaison officer of the U. S. Public Health Service between the U. S. Army and the State health agencies in the Fourth Corps Area in sanitation work, including antimalaria activities. Experimental work on malaria therapeutics of the National Institute of Health is being carried forwafd in Washington under the direction of Dr. L. F. Small.

Work in the Central States

A number of local research and mosquito-control projects are under way in the Central States. Antiano-

pheline work is being pursued, particularly in southern Illinois and in Missouri.

In Illinois 8 mosquito-abatement districts are organized under the State laws, and in addition thereto work is being done in a number of larger cities and villages in the southern part of the State where a WPA project embraces 14 counties. Under this program drainage and other permanent improvements are being carried out. No spraying of mosquito larvicide is included in this program. The most intensive and extensive work in this area centers around Chicago, with the DesPlaines Valley Mosquito Abatement District taking the lead.

Mr. J. Lyell Clarke, in charge of the DesPlaines Valley work which was organized in 1927, reports that in cooperation with others a tri-county mosquito survey has been conducted and the data are being analyzed.

The DesPlaines Valley District covers 76½ square miles, and about 200,000 people reside therein. The work is sustained by taxation which cannot exceed one-half mill per dollar of assessed valuation. The work is conducted under a board of trustees of five members serving without compensation, and the employees consist of a sanitary engineer, a field engineer, a general foreman, and 4 district foreman, with 15 men and 2 inspectors employed during the breeding season. The equipment includes 4 power sprayers, equipped for use on marshes; 2 power pumps for spraying rivers and streams, mounted on barges; and 3 motorcycles for spraying catch basins. A considerable force of WPA workers is employed, and in connection with the 20" projects the District operates 1 dragline, 1 tractor and grader, and other small equipment.

Mr. Clark reports that the relative abundance of mosquitoes in the Chicago region, outside of the District, during the past season was 8 per cent below the average for 12 previous years, and that the relative abundance

of these pests within the District was 20 percent below that average. The relative abundance of mosquitoes within the District last year was 48 percent of that outside the District.

In Minnesota Dr. W. A. Riley, of the University of Minnesota, reports that during the past 6 years considerable attention has been given by him and his staff to a survey of the mosquito fauna of the State. Recently this survey has been financed to a considerable extent by the Department of Health. Thirty-eight species of mosquitoes have been reported for the State. These include 4 species of anophelines--Anopheles quadrimaculatus, A. walkeri, A. punctipennis, and A. macupennis var. occidentalis. A. quadrimaculatus is present particularly in the southeastern part of the State along the Mississippi River, while maculipennis is most common species of the north and central parts of the State. A. walkeri is the most common of the 4 species and is widely distributed.

The seasons of 1937 and 1938 were outstanding because of the abundance of Aedes vexans. In 1939 and 1940 this species was so reduced in numbers as to elicit very few complaints. It has been abundant again in 1941, but not so troublesome as in 1937-38. The temperatures were much above normal during 1939, and along the Mississippi River south of the Twin Cities, Anopheles quadrimaculatus was very abundant. During 1940, when temperatures were more nearly normal, it was present in small numbers only.

In Wyoming a few local efforts toward mosquito control have been made. Dr. W. B. Owen, incidental to other work, is conducting a mosquito survey in the State.

Work in the Intermountain Region

A few local mosquito-control undertakings were carried on in 1940 in Arizona, New Mexico, Utah, and Montana. As in the past, the most notable work was

carried on under the direction of Dr. R. V. Chamberlain and Mr. Don M. Rees, of the University of Utah, in the Salt Lake Abatment District.

Work On The Pacific Coast

In California it is reported by Dr. W. B. Herms that in 1940 mosquitoes were more than normally prevalent in most of the State owing to the excessive rainfall during the winter and spring months. Much interest has been evident in the organization of mosquito-abatement districts in Glenn, Fresno, Yuba, and Sutter Counties, and surveys made throughout the State which indicated a considerable number of cases of human encephalitis of the equine type have increased the interest of a number of counties in the Sacramento and San Joaquin Valleys in anti-mosquito work.

Two of the species of mosquitoes which previously have been incriminated as carriers of encephalomyelitis under laboratory conditions were present in areas where encephalitis in man was in evidence. These are the freshwater forms of Aedes dorsalis and A. nigromaculis. Laboratory experiments performed at the University of California have confirmed previous work showing that both Aedes dorsalis and A. nigromaculis can transmit equine encephalomyelitis, as can A. lateralis under laboratory conditions. Experiments with A. varipalpis were negative.

Mosquito-control activities in California have reached a peak in Alameda County under the superintendency of Mr. Harold F. Gray. This county was organized as a mosquito-abatement district slightly over 10 years ago. Since the district was organized, 147 miles of ditches have been constructed on 12,000 acres of marsh, 400 miles of ditches have been cleaned of filth and weeds, 16,700 acres of marsh have been oiled, and 2,400 miles of creeks, roadside ditches, and drains have been oiled. Oiling has been carried out systematically on 264,874 catch basins, and over 6,000 large pools have been stocked

with top minnows. Much educational and promotional work has been carried out and the county now enjoys the reputation of being an area relatively free from mosquito annoyance. Mr. Gray reports the average cost of mosquito-control work to the residents of the Alameda County Abatement District as $0.08 per capita per year, and after the first year of operation the tax rate has never been higher than 1 mill.

In Oregon mosquito-control activities centered around Portland, where the efforts of city and county authorities is still directed toward the control of floodwater mosquitoes along the lower Columbia River. The seriousness of mosquito problems in Washington and Oregon was below average for 1940 and 1941, largely on account of the flood crests of the Columbia and Willamette Rivers, which were approximately 6 feet below the average in 1940 and 9 feet below the average in 1941. The rainfall in that area was also below normal, and thus trouble from Culex, Theobaldia, and Anopheles was reduced. In the Portland area control work has consisted of clearing, ditching, and oiling, as well as a certain amount of dredging and filling. The Bonneville dam has tended to reduce fluctuation of water levels between the dam on the Columbia River and The Dallas, and has covered extensive areas of willow flats which formerly were high producers of floodwater mosquitoes.

In Washington considerable attention was given to plans for mosquito control in the Yakima Valley because of the occurrence there of a considerable number of cases of human and equine encephalitis. A cooperative project is now under way in the Yakima Valley involving the Hooper Foundation of the University of California, the Infantile Paralysis Foundation, the Bureau of Entomology and Plant Quarantine, and local health authorities, in which the possible relation of mosquitoes to this disease of man and animals is being investigated. This investigation has recently borne fruit in the published announcement that

the viruses of encephalitis (St. Louis type) and the western strain of equine encephalomyelitis have been isolated from the mosquito Culex tarsalis, collected from endemic areas in the Yakima Valley.

The Bureau of Entomology and Plant Quarantine continued its research work with headquarters in Portland, Oregon, with Mr. E. F. Knipling in charge. One of the outstanding results of the work was the determination by the men at the Portland laboratory, working in cooperation with the Bacteriology Department of Oregon State College, that the reduction of oxygen in the water is an important stimulus to the hatching of the eggs of Aedes vexans and other floodwater mosquitoes. Considerable work with results of interest and economic importance was done with larvicides. The resistance of larvae of different species to different larvicides was weighed and found to differ considerably. The susceptibility of larvae in different instars was also compared, and it was found that the younger larvae were uniformly more susceptible to larvicide than the older ones.

Aedes Aegypti Linnaeus, The Yellow Fever Mosquito, In Central Missouri

by C. F. Adams

Late in September mosquito larvae were found in a small aquarium in the office of the State Health Commissioner. These were taken to the Laboratory of the State Department of Health where, on October 4, 1941, an adult emerged that proved to be of this species.

This location, Jefferson City, is near the center of the state, about 38.6 degrees north latitude, and probably is the "fartherest north" for the species in Missouri.

Possibility of Yellow Fever Epidemic In U. S.

According to the New York World Telegram of

January 28, 1942, W. W. Wirth, assistant in the biology department of Louisiana Polytechnic Institute warned in a paper presented to the fourth annual Southern Pest Control Operators' conference "Although the fever has gone, we still have the yellow fever mosquito with us, breeding abundantly near the clustered habitations in our towns and cities of the South. Fortunately, our quarantine ports have caught all cases coming our way from Africa, where epidemics still rage periodically. With rapid airplane transportation...we may now very easily let infected mosquitoes or persons about to come down with the fever into our cities to threaten us with a new epidemic.

ACTIVITIES IN MEMBER STATES

Mosquito Control in the Second Corps Area

by Dr. Albert Russell
Senior Surgeon, U.S P.H.S. Liaison Officer, Second Corps Area, Fort Jay, Governors Island, N. Y.

The Second Corps Area of the Army comprises the three states of New York, New Jersey and Delaware. There are concentrated in this area an unusually large number of essential defense plants, in addition to important Army and Navy establishments. Many of the defense industries and service establishments are located close to tidewater or inland marshes and other sources of large scale mosquito breeding. The need of effective mosquito control work for civilian defense as well as Army and Navy personnel is readily understood.

Under the general arrangement between the States and the W.P.A., the States are to furnish supervision with the help of funds provided by the U.S.P.H.S., with all labor, materials, equipment, etc. necessary provided by the WPA. Fortunately, in the Second Corps Area through various state county or city agencies already in existence, much of the basic data as to location of breeding places, cost of elimination, maps, etc. were already available, and where

this was not the case the necessary surveys have been made or are being made.

The mosquito control projects which have been planned for the Corps Area to date include the following: Additional projects will be added from time to time.

NEW YORK STATE:

CAMP UPTON: This work is in two projects, the one inside the reservation is sponsored by the Army and the one outside the camp is sponsored by the N. Y. State Health Department and the Suffolk County Mosquito Control Commission. Both projects include thorough spraying of breeding places and the deepening and cleaning of Carman's River and Peconic River and tributaries west and east of Camp Upton. The total cost will be about $125,000. Work on this project is partly completed.

FORT TOTTEN, QUEENS, N. Y. CITY: About 350 men have been employed in this area which includes the fort, several shipyards and as far west as the La Guardia Airport. Some spraying was done during the summer and drainage work was started Sept. 15th. This project as well as the one at Floyd Bennett Naval Airport, Brooklyn, and the one in Staten Island are sponsored by the N. Y. City Department of Sanitation.

FLOYD BENNETT NAVAL AIRPORT, BROOKLYN, and FORT TILDEN, QUEENS: Approximately 100 men were employed and work was started Nov. 5th. It will include larvicide spraying and extensive salt marsh and fresh water ditch regrading.

FORT WADSWORTH and MILLER FIELD, STATEN ISLAND: Started with some spraying last summer and with drainage work on October 15th. About 125 men are at work on both salt marsh and fresh water areas.

The total original cost of the three N. Y. City projects was $139,000.

NEW JERSEY:

Mosquito control work in New Jersey has included the following:

RARITAN ARSENAL: Work was started inside the arsena reservation early last summer as a W.P.A. project and was sponsored by the Commanding Officer of the Raritan Arsena and the Middlesex County Mosquito Extermination Commissio An average of about 30 men have been employed on spraying drainage and salt marsh ditching maintenance. The total cost of the work is to be $43,000.

MONMOUTH COUNTY -KEYPORT TO LONG BRANCH: This project began Sept. 2nd and has averaged about 40 to 50 men. It consists largely of maintenance of drainage and some new ditching is to be carried on at a total cost of $47,000. The work is somewhat behind schedule due to shortage of men. The project was sponsored by the Monmouth County Mosquito Extermination Commission and supervised by it. This work is being done for the protection of Fort Monmouth, the Signal Corps Training Centre for the United States.

HUDSON COUNTY: Mosquito control project totaling $225,000 includes diking, tide gating and ditching work on the salt marshes. Project was sponsored and supervise by the Hudson County Mosquito Extermination Commission. The diking work is almost two-thirds finished and going well and bulkhead work has just started.

FORT HANCOCK, SANDY HOOK: About $35,000 worth of work involving filling and drainage with some spraying ha been carried on at Fort Hancock, Sandy Hook. This work is sponsored by the Army together with the Monmouth Count Mosquito Extermination Commission and will tie in with the Monmouth County work previously mentioned.

A state wide mosquito control project totaling $383,000 sponsored by the N. J. State Health Department and the N. J. Experiment Station has been approved and

ork under it has started as follows:

FORT DIX: $60,000 of the $383,000 is to be used as W.P.A. project at Fort Dix. This is co-sponsored by the urlington County Mosquito Extermination Commission and ork has already started. The work to be done is to be ntirely outside of the Fort Dix Army Reservation and will upplement the work which has been done by the Army within he reservation first by the employment of 100 civilian aborers beginning in the early summer and then followed y the work of a C.C.C. company and more recently by labor rovided through the National Youth Administration for the rmy. The beginning of this work was delayed owing to the ecessary procedure in the re-establishment of the Bur- ington County Mosquito Extermination Commission. This as been accomplished.

PICATINNY ARSENAL, DOVER, N. J.: Work at Picatinny rsenal started about Nov. 15th with 20 men partly within nd partly outside the arsenal reservation Total cost s estimated at $118,000 and involves deepening of a large utlet creek through rock to relieve very swampy condi- ions within the arsenal property.

FRANKLIN and OGDENSBURG, SUSSEX COUNTY, N. J.: rainage work around the New Jersey Zinc Company mines nd refineries. This is to be directly for malaria con- rol which has been a serious problem in the vicinity for everal years. The total cost of the project will be 33,932. It is co-sponsored by the Sussex County Mosquito xtermination Commission. This project had the approval f the Liaison Officer on December 18, 1941, Army approval ot being needed inasmuch as there are no troops within 0 miles.

ISLAND BEACH ARMY RECREATIONAL AREA SOUTH OF SEASIDE ARK, OCEAN COUNTY, N. J.: About $9,000 will be needed or this work. This project is co-sponsored by the Ocean ounty Mosquito Extermination Commission, and it had the pproval of the Liaison Officer on October 9, 1941. This ork involves the application of larvicides, drainage, nd filling, and incidental appurtenant work.

DELAWARE ORDNANCE DEPOT, SALEM COUNTY, N. J.: Work in and around the military zone of the Depot. This project has been approved for the amount of $22,058 by the Office of the Commanding General and the Liaison Officer, and work no doubt will be started in the near future. The project was approved as of December 18, 1941.

At the time of writing the following projects are in preparation:

CAPE MAY NAVAL AIR STATION, CAPE MAY, N. J.
INDUSTRIAL AREA FROM CAMDEN SOUTH TO THE VICINITY OF PENNSVILLE ALONG THE DELAWARE RIVER.
LAKEHURST NAVAL AIR STATION.

Additional work is also contemplated in projects to be set up for mosquito control work in the INDUSTRIAL AREA ALONG THE DELAWARE RIVER FROM CAMDEN NORTHWARD toward Trenton as far as may be necessary. Work at DISMAL SWAMP (MIDDLESEX COUNTY) between PLAINFIELD and METUCHEN, N. J. - and an industrial area at BENDIX, BERGEN COUNTY around a large aircraft plant and training centre - drainage work at NORTH ARLINGTON MEADOW, BERGEN COUNTY, N. J.

DELAWARE:

Work in Delaware has included a project to cost $63,000 surrounding FORT DuPONT south of Wilmington. About 25 to 30 men have been working since June 21st when the project started. Work involves drainage and tide gating of extensive marshes, flooding of some areas which are now marsh, and other work. In addition a state wide project costing $36,000 has been approved of which $9,600 is to be spent at FORT MILES, CAPE HELOPEN near Lewes, Del., and $5,400 at FORT SAULSBURY. Some additional work may also be done in the WILMINGTON INDUSTRIAL AREA in 1942.

All of this work in the three states is being carefully planned and executed so as to give the very best results in mosquito control for the money being expended. The military and naval authorities have given excellent

cooperation in these projects which are designed for the health and comfort of personnel in the vicinity.

Mosquito Control In The First Corps Area

by Russell W. Gies,
Sanitary Engineer Reserve

The First Corps Area is made up of the six New England States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut. It is all included as part of District No. 1 of the United State Public Health Service. Doctor Joseph Bolten is Liaison Officer of that Service for the Corps Area.

Massachusetts, Rhode Island and Connecticut have all done large scale mosquito control work in past years, but Maine, New Hampshire and Vermont have not carried on organized campaigns except in a few local cases.

In Massachusetts the State Reclamation Board, of which Mr. Edward Wright, Sanitary Engineer of the State Health Department is Chairman, is in general charge of this work. Much public support has been given to mosquito control in this state because of the very serious outbreak of equine and human encephalomyelitis or sleeping sickness a few years ago which has been thought to be transmitted by several common varieties of mosquitoes. The Reclamation Board has sponsored the various W.P.A. mosquito control projects in the state.

In Rhode Island the State Department of Agriculture has done considerable control work in past years and is co-sponsoring all defense projects in the state with the State Health Department.

Connecticut has a mosquito control board which consists of the State Health Commissioner as Chairman, the Director of the State Experiment Station and the State Commissioner of Public Works. About 20,000 acres of salt marsh along the entire coast were ditched in past years with a consequent maintenance problem, and some

upland work done by various towns.

The mosquito control projects which have been planned for the First Corps Area to date are as follows:

MAINE:

PORTLAND AND S. PORTLAND AREA: PORTLAND has become an important naval station and at South Portland, shipyards are in operation and cost defenses require considerable Army personnel.

The Army authorities at Fort Williams and other posts have done spraying and some drainage work, but there is a large local problem in South Portland and Cape Elizabeth. In additional about 3,000 acres of unditched salt marshes only four miles southeast of South Portland have sent large broods of salt marsh mosquitoes into that community and Fort Williams under favorable breeding conditions. The starting of ditching of these marshes, known as the Scarborough Marshes, together with other upland drainage, and local inspection and spraying in the Portland Area are included as part of a statewide project sponsored by the State Department of Health. This project will total about $25,000 for work until July 1, 1942.

KITTERY and FORT FOSTER: As part of the statewide project miscellaneous drainage and inspection and spraying will be done at Kittery around the Navy Yard there and at Fort Foster nearby.

Mr. Charles Becker is in direct charge of these projects for the State Health Bureau.

NEW HAMPSHIRE:

PORTSMOUTH AREA: Work to be done in the Portsmouth Area for the protection of Navy Yard workers and at nearby Fort Constitution and Camp Langdon includes inspection and spraying in the vicinity of these posts, with considerable drainage of fresh water and salt marsh sections nearby.

e salt marshes have been largely ditched as C.W.A. or P.A. projects some years ago by the State, but the tching is in need of maintenance. An unusual feature work in this state is the cooperation of an Advisory mmittee from the State Health Department, State Experi- nt Station and the State Conservation Department.

MANCHESTER AIRPORT AREA: Work has been started here November on drainage and opening up obstructed streams d brooks. About 20 men have been used on this W.P.A. oject here. Spraying is planned for 1942.

The statewide project totals about $22,000 and al- ough only these two sub-projects are planned now, addi- onal work may have to be done later on in other parts the state.

Mr. Milton Teich is in direct charge of the New mpshire work for the State Board of Health.

RMONT:

No work is planned as yet for Vermont.

SSACHUSETTS:

CAMP EDWARDS: Larvicide work and salt marsh and some esh water drainage has been carried on in the vicinity this Army Camp on Cape Cod.

QUINCY and BOSTON: For the protection of Army and vy personnel and the defense industrial plants such the large Fore River Shipbuilding works at Quincy in- nsive larvicide and necessary drainage work is being ne here.

FORT DEVENS: Stream channelling and drainage as well spraying has been carried on around this Army post.

WESTOVER FIELD near Chicopee is another area where rveys indicate the need of mosquito control work to be arted late this winter.

RHODE ISLAND:

Work in Rhode Island has been hampered by shortage of W.P.A. manpower. The project areas include Quonsett Point Naval Air Base, Fort Greene, Fort Kearney, Fort Adams, Fort Getty, Fort Church, Fort Wetherill and Jamestown Island.

Mr. Milton Price is in charge of the statewide work in Rhode Island which will cost more than $150,000.

CONNECTICUT:

No project has yet been prepared for Connecticut.

Status of National-Defense, Mosquito-Control Projects in Delaware

by L. A. Stearns

Work under the W.P.A. mosquito and malaria-control project ($62,693) for the Fort duPont area (see Mosquito News, Vol. 1, No. 3, pp. 2-4 and No. 4, pp. 7-9) has been in progress since June, 1941. Accomplishments for the first six months (to December 27, 1941) were briefly as follows: For survey or layout work, clearing brush, cutting ditch sides, excavating ditch, cleaning ditch, filling holes, tidegate installation and miscellaneous activities - a total of 40,438 man hours for an average of 47 men employed; new ditching, 55,681 lin. ft. 10" x 20" (all widths expressed as such); approximately 80 per cent of area within 2 miles of this Post completed; supervision on part of representatives of the sponsoring agencies (State Highway Department, State Board of Health and State Agricultural Experiment Station) amounting to 1912 man hours.

Operations were commenced recently (January, 1942) about Fort Saulsbury and about Fort Miles (an extensive new army development at Cape Henlopen) under a state-wide mosquito and malaria-control project carrying an allotment of $36,095. Although some new strictures will be install most of the work will be of a maintenance character, sinc

these sections of the State were ditched or otherwise brought under control by Civilian Conservation Corps labor some years ago (1933-1938).

In view of the expressed interest of the U. S. Public Health Service in the early establishment of a mosquito-control project covering the entire Philadelphia - Camden - Wilmington area, a program for the portion thereof within the State of Delaware has just been prepared (February 3, 1942), the cost of which would approximate $90,000. From the standpoint of the current, national defense effort, the City of Wilmington and adjoining suburban areas constitute one of the most important centers of the Atlantic Seaboard. Naturally, the discomfort experienced in this district is much less than further south where the cities and towns are but a short distance from large river and bayside marshes. Nevertheless, the population concerned (more than one-half that of the State as a whole) and expanding defense industries warrant the early consideration of anti-mosquito work.

Suffolk County Long Island National Defense and Mosquito Control

by J. Dunbar Ross
Secretary Suffolk County
Mosquito Exterm. Commission.

The contribution of the Suffolk County Mosquito Elimination Commission toward National Defense is aimed at two main objectives. First is the construction of thirty-eight miles of ditches and the placing of 782 feet of 24" culvert under roads in and around Camp Upton which is a 3700 acre lay-out almost in the center of the county. This work is being carried out mainly to control malaria carrying mosquitoes but at the same time remove all other troublesome species as well. This project was taken on with the assistance of W.P.A. in addition to our regular schedule which is going on as usual.

Secondly the great agricultural industry in the county as well as the presence of many industrial plants working in defense orders makes it necessary to continue to persistently prosecute the Commission's program of control. This is essential not only from a standpoint of public health but also to create comfortable working and living conditions as much as possible for the Army, Navy and Civilian residents.

Maryland

Dr. E. N. Cory, State Entomologist reports no mosquito work going on in the state although an engineer of the Public Health Service has been assigned to the State Department of Health for surveying conditions around Army camps.

Rhode Island

Mr. Milton Price, Supervisor of Mosquito Control for Rhode Island Department of Agriculture and Conservation wrote that shortage of W.P.A. men, necessary to pursue thei projects, has delayed the National Defense projects on mosquito control in Rhode Island. Mr. Price also reports new legislation under consideration for transferring mosquito control work from the Department of Agriculture and Conservation to the Department of Health.

DEVELOPMENTS IN MOSQUITO CONTROL

Tests with Carbon Dioxide and Light as Attractants for Mosquitoes, with Special Emphasis on the Malaria Mosquito, Anopheles Quadrimaculatus

by C. B. Huffaker
Delaware Agricultural
Experiment Station, Newark

The New Jersey mosquito trap has been used very extensively as an index to the total mosquito population and the relative importance of different species in a given area of annoyance. A photograph of this trap was presented

by Mulhern (1934) and also by King, et al (1939). Headlee (1934) and (1941) published data which revealed the tremendous attraction of CO_2 for female mosquitoes. The marked effectiveness of this trap, with or without the additional of CO_2, is not questioned. However, it has not found acceptance for use in determining Anopheles quadrimaculatus populations in the malaria areas of the South.

The writer operated three of these traps, one with a light, one using Dry Ice without a light, and one with both light and Dry Ice, at Delaware City, Delaware, for four hours on the nights of September 24 and 25 and throughout the night of October 7, 1941. The results may not be considered critical, because of the time of the year. July or August would undoubtedly have been better. Nevertheless, these data strongly indicate that A. quadrimaculatus is not appreciably attracted to the New Jersey mosquito trap either with or without Dry Ice.

The traps were operated on nights that were generally favorable for mosquito activity, in a district where this species was found breeding in 72 per cent of the places inspected during the months of September and October. The corresponding figure for Anopheles crucians was 23 per cent; and for Culex salinarius, 55 per cent. Furthermore, in the nearest, large, permanent breeding area, A. quadrimaculatus represented 57 per cent of the total anophelines present, whereas A. crucians represented only 31 per cent for these months. Total anopheline breeding was nearly 2 larvae and/or pupae per dip.

In addition to the breeding records, weekly inspections for adult mosquitoes were made in a barn near which these traps were operated. For the period in question, A. quadrimaculatus represented 49 per cent; A. crucians, 44 per cent; A. punctipennis, 1 per cent; and C. salinarius, 6 per cent of the total estimate of 3752 females for the three inspections.

It is certain, therefore, that A. quadrimaculatus was the most abundant anopheline mosquito in the vicinity

and perhaps almost as abundant as C. salinarius. Yet, as may be seen in Table 1, the 3-night catch for a 4-hour period for A. quadrimaculatus was only 1.3 per cent of the total catch for Dry Ice; 0.1 per cent, for Dry Ice and light; and 0.3 percent, for light without Dry Ice. The corresponding percentages for A. crucians were 41.1, 18.2, and 13.5, respectively; for C. salinarius, 24.0, 62.9, and 64.7, respectively; and for A. walkeri, 7.4, 3.5 and 2.8, respectively.

According to these data, A. crucians showed a relativ ly high degree of attraction to carbon dioxide, while C. salinarius showed a high degree of attraction to light. T slightly greater number of A. quadrimaculatus in the Dry I trap may mean that this species was repelled by the light of the other two traps, or may be the result of purely chance distribution.

Inspections of the barn before and just after these tests showed that both A. quadrimaculatus and A. crucians were active, and had moved out of their resting quarters.

The trap collections on the night of October 7, from 9:45 until morning, were essentially the same as the four-hour period.

Table 1. - Female Mosquitoes Collected on Three Nights by Traps Near a Cattle Barn Containing Large Numbers of Anopheles quadrimaculatus, with dry ice and Light as Attractants.

3 - Night totals, 5:45-9:45 E.S.T.

	Dry Ice		Dry Ice and Light		Light	
	No.	%	No.	%	No.	%
A. quadrimaculatus	13	1.30	8	0.09	4	0.26
A. crucians	412	41.12	1626	18.16	211	13.49
A. walkeri	74	7.39	317	3.54	44	2.81

. Salinarius	251	25.05	5628	62.85	996	63.68
ther species	252	25.14	1375	15.36	309	19.76
	1002	100.	8954	100.	1564	100.00

[1]The dipping method used in primarily suited to nopheles inspections, and the relative abundance of C. alinarius was probably greater.

[2]A. quadrimaculatus and A. crucians are the only pecies in this area that gather in barns in great numbers.

eadlee, T. J. 1934. Mosquito work in New Jersey for the Year 1933. Proc. N. J. Mosq. Exter. Ass'n. 21: 8-37

_____ 1941. New Jersey Mosquito Problems. Proc. N. J. Mosq. Exter. Assoc. 28:7-12.

ing, W. V., C. H. Bradley, and T. E. McNeil, 1939. The Mosquitoes of the Southeastern States. U.S.D.A. Misc. Pub. 236: 1-91.

ulhern, T. D. 1934. A New Development in Mosquito Traps. Proc. N. J. Mosq. Exter. Ass'n. 21: 137-140.

PUBLISHED ARTICLES OF INTEREST

Mr. Thomas D. Mulhern, Secretary reports the follow-ng published article:

> Jan. 2, 1942, "Science" - article entitled "The Work of the Rockefeller Foundation in Brazil".

The article refers to yellow fever and to work gainst Anopheles gambiae, the "worst vector of malaria" s well as other health activities of the Rockefeller oundation.

PERSONAL NOTES

Mr. W. A. Connell of the Department of Entomology t the University of Delaware, who, since October 16, 1941 ad been engaged in a study of mosquito larvicides under

a fellowship sponsored by Hercules Powder Company of Wilmington, Delaware was recalled to active duty in the Army on January 31, 1942. He had previously served from June 5 to September 18, 1941, and had been released under the age limitations then in effect.

The research commenced by Mr. Connell was assumed by Mr. C. B. Huffaker of the same department on February 1, 1942. Mr. Huffaker, who came to Delaware on April 16, 19 with a background of several years experience with the Tennessee Valley Authority, has had charge of mosquito trapping work in the State and has been investigating Anopheline breeding and activity as well. He is now responsible for all lines of endeavor in this particular field.

Mr. H. Joseph Stevens, formerly with the Suffolk Cou (Long Island) Mosquito Commission is now with the U. S. Public Health Service and is stationed in their New York City office.

Mr. John W. Scott of the Union County (New Jersey) Mosquito Commission has been called to active duty with the U. S. Army.